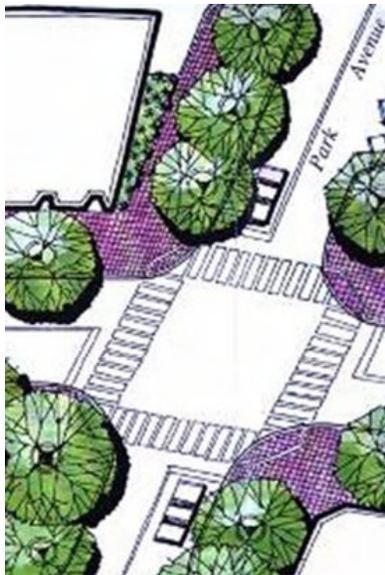


NEWTOWN CT

Traffic Calming Resource Guide



Purpose

The purpose of the Traffic Calming Guide is to assist Newtown residents in gaining a better understanding of the tools available and steps necessary to seek traffic calming services and measures. The following sections of this guide give a more detailed description of the different levels of traffic calming and the decision-making and implementation process. It also identifies a toolbox of traffic calming measures that range from education to enforcement to engineering along with implementation processes to help neighborhoods identify and remedy local conditions. This Traffic Calming Guide focuses on residential streets. The goal is to calm traffic on these local streets, allowing children and families to feel more secure in their own neighborhoods. Traffic calming principles can also be applied to arterial streets which serve multiple purposes and to enhance pedestrian crossings of major streets.

Traffic Problems in Neighborhoods

It is important to note that each street in the community is a part of the larger roadway network that connects residents to each other, work, schools, goods, services, and the myriad of destinations we travel to daily. However, streets not only serve to connect us to the destinations we seek to reach, they also help to define the vitality, character, and livability of our neighborhoods. Streets are shaped and impacted by their surrounding land uses. For example the design and location of commercial activities, schools, services, and other streets may directly impact traffic in your neighborhood. Common issues within neighborhoods include speeding, traffic volumes, and the utilization of neighborhood streets as a cut through route, among others. We are all speeders, guilty of driving too fast in our own neighborhoods at times, some of us more often than others. “Speeders” are not bad guys from somewhere else – they are our neighbors and friends, responsible citizens like ourselves who are also committed to improving the safety and peacefulness of our neighborhoods. Neighborhood activity is an important tool that reminds neighbors to pay attention to their driving habits and of their mutual responsibility to the residents – particularly the children living in the community.

Definition of Traffic Calming:

The Institute of Transportation Engineers (ITE) definition for traffic calming is:

“Traffic calming is the combination of mainly physical measures that reduce the negative effects of motor vehicle use, alter driver behavior, and improve conditions for non-motorized street users.”

By design, traffic calming is a self-enforcing traffic management approach that forces motorists to alter their speed or direction of travel. The purpose of traffic calming is to improve safety, especially for pedestrians and bicyclists, and to improve the environment or “livability” of streets for residents and visitors. Enhanced safety is one of the most fundamental benefits of traffic calming. By decreasing volume and/or reducing speed the number and severity of accidents is greatly diminished.

The objectives of traffic calming include:

- Slow vehicular travel speeds

- Increase safety for non-motorized street users
- Reduce the frequency and severity of collisions
- Increase access for all modes
- Reduce the need for police enforcement
- Enhance the street environment

Traffic calming techniques may include education, enforcement, or engineering – “the three E’s” – to shift traffic patterns and/or reduce speeds. Most traffic calming measures focus on engineering changes to alter driver behavior. Traffic calming techniques may include physical changes such as roadway narrowing, speed humps, raised intersections, traffic circles, pavement markings, signage, and others. Education and enforcement efforts should be considered prior to engineering alternatives and as a complement to engineering efforts.

The Effects of Traffic Calming

Traffic calming has a different definition for different people, and typically, for each resident in favor of implementing traffic calming measures, there is another resident who is opposed. As traffic calming measures have proliferated around the country, both political support and political opposition have grown. The more traffic calming occurs in a locality, the more controversy seems to erupt. In fact, it is not unusual to find that those residents who were initially behind the implementation of traffic calming measures in a neighborhood are the same persons who lead campaigns for their removal six months to a year later. As traffic calming expands beyond local streets to major thoroughfares, the potential for controversy increases.

Effectiveness of Traffic Calming Devices

Physical actions such as the installation of speed humps, traffic circles, street closures, etc. are almost always successful in forcing traffic to behave in an intended fashion. In certain situations they can achieve the desired result by utilizing a one-time capital expenditure and generally low ongoing maintenance costs.

Effect on Emergency Vehicles Response Times

Any traffic calming tool that might be effective because it physically controls traffic generally has a negative impact on several classes of emergency vehicles to varying degrees. Newtown, as well as its residents and businesses, place a very high priority on minimizing emergency response times. Installation of most physical traffic calming tools can increase emergency response time. This is especially true for fire apparatus and ambulances. Because of the heavy weight of fire engines and the delicate instruments and patients within ambulances, these vehicles must come to almost a complete stop when they encounter a bump, dip or sharp curve. Creating bumps, dips and sharp curves is often precisely the objective being sought by many of the traffic calming tools. While these maneuvers will cause moderate discomfort and delay for normal passenger vehicles, they cause a much greater problem for emergency response vehicles.

Traffic Diversion

Another concern is that implementing traffic calming devices may move the problem rather than solve it. In most instances the placing of impediments on a particular neighborhood street may merely divert some or all of that traffic to other neighborhood streets.

Considerations for Other Roadway Users

In addition to the safety concerns already discussed in this report, some types of traffic calming which involve addition of significant vertical and horizontal elements can often have unintended negative safety impacts on certain roadway users. They can result in worsening the situation for a range of roadway users such as bicyclists, roller skaters, skate boarders, joggers, pedestrians and drivers parking vehicles.

Noise Impacts

The noise impact to adjacent residents resulting from vehicles braking, or going over and around traffic calming devices such as speed humps can have a major impact on the acceptability of these devices by residents living closest to them. The unanimous support of residents living adjacent to locations where physical changes are proposed will be essential to the success of any project.

Parking

It is often necessary to prohibit on-street parking in the immediate vicinity of the intersection in order to accommodate the realigned vehicle path.

Visual Impacts and Aesthetic Concerns

While some traffic calming devices can have favorable aesthetic impacts, others can be, by their nature, unsightly. Devices such as speed humps and diverters most often pose no opportunity for incorporation of aesthetics and can have negative visual impacts.

Increased Maintenance Costs

Street maintenance costs will increase in two areas. Landscaping associated with such devices as traffic circles, chokers and neck downs will require regular maintenance. Devices such as speed humps will have to be reinstalled each time a residential street is overlaid.

Menu of Traffic Calming Measures

The following pages include information on traffic calming measures that can be implemented in your neighborhood. Generally, there are five approaches to calming traffic within a neighborhood or community:

- Programmatic Measures
- Non-Physical Measures
- Vertical Deflection Measures
- Horizontal Deflection Measures
- Traffic Volume Reduction Measures (not applicable)

It should be noted that measures which divert traffic volumes from a residential street is not the objective of The Newtown Traffic Calming Program due to the potential impact to adjacent residential streets. This type of measure generally includes physical diverters, street closures and median barriers which restrict vehicles from turning at specific locations. Following is a description and examples of the other approaches to calming traffic.

Programmatic Measures

Programmatic Measures are generally the first course of action taken if it is determined that speeds or safety conditions exceed the City's standards. They primarily include educational and enforcement programs rather than physical modifications to the street.

* ***Police Enforcement*** entails the presence of police to monitor speeds and issue citations. This method is used as an initial attempt to reduce speeds on streets. It is most applicable on streets with documented speeding problems.

* ***Radar Trailer*** is a mobile radar display that informs drivers of their speed. The Newtown Police Department has utilized this equipment throughout town for the past several years.

* ***Neighborhood Traffic Safety Campaigns*** usually consist of personalized letters or general flyers that are distributed to all residents of a neighborhood and that cite statistics on speeding within the neighborhood and appeal for compliance with traffic laws.

Non-Physical Measures

Non-Physical Measures include any mitigation that does not require the construction of physical modifications to the roadway while utilizing lower cost treatments. Some common basic elements include:

* ***Warning Signs*** such as "Children at Play" or Pedestrian signs can inform non-residents of the residential nature of the street.

* ***Stop Signs*** are intended to assign the right-way between motorists, pedestrians and cyclists at

an intersection. Although many citizens believe that stop signs help reduce speeds on their street, studies have shown that mid-block speeds are higher between stopped approaches than at those locations without stop signs. Newtown does not utilize stop signs as speed reduction tools.

***Truck Restrictions** can be achieved through the posting of truck restriction signs at the entry to neighborhoods, such as no thru trucks. It is not legal to prohibit trucks from a residential street, only to restrict trucks whom are going from and to a location outside of the community.

***Signed Turn Restrictions** can be implemented through the use of a sign prohibiting certain movements at an intersection, e.g., “No Left Turn.”

***High Visibility Crosswalks** incorporate striped patterns, raised tables, pavement lights, improved signing or advance flashing beacons.

***Striping** is used to create narrow lanes which give the impression of a narrow street. This makes the motorist feel restricted, which helps reduce speeds. Striping can also be used to create medians.

***Speed Legends** are numerals painted on the roadway indicating the current speed limit. These legends can be useful in reinforcing a reduction in speed limit between one segment of a roadway and another segment.

***Raised Pavement Markers** can be used on curves where vehicles have a tendency to deviate outside of the proper path, or can be used as a rectangular array across a roadway creating a “rumble strip.”

***Curb Markings** are special curb paintings that restrict or limit parking along the curb to enhance safety and/or increase visibility of pedestrians and bicyclists.

***High Visibility Signs** may include larger signs or high intensity yellow-green signs on streets to ensure visibility to motorists.

***Parking** can influence speed on a residential street. Streets with parking areas that are rarely used can lead to higher speeds while narrow streets with parking on both sides can create a slower moving street.

Vertical Deflection Measures

Vertical deflection measures use variations in pavement height and alternative paving materials to cause drivers discomfort at high travel speeds. The intention of the deflection is to reduce speeds along a street within a neighborhood or at a specific location so that others users, such as pedestrians, are presented with a roadway feature which better meets their needs. Some common vertical deflection devices include:

***Raised Crosswalks and Intersections** are raised areas covering either the crosswalk or the entire intersection. They are often constructed with brick or textured materials to increase visibility for approaching motorists and to further identify 'pedestrian territory.'

***Speed Humps** are raised pavement areas placed across the road. A **Speed Table** has a larger flat area than a speed hump. **Speed cushions** consist of either recycled rubber or asphalt, raised about 3 inches in height and placed in groups of three across the road. The length of each cushion is about 10 feet. The spaces between the cushions allow emergency vehicles to partially straddle the device..

***Textured Pavement** includes the use of stamped pavement or alternate paving materials to create an uneven surface for vehicles to traverse. They may be used to emphasize either an intersection or pedestrian crossing area.

Horizontal Deflection Measures

Horizontal deflection measures use raised islands and curb extensions to deflect the driver's path away from a straight line along roadways and through intersections. The intention of the deflection is to reduce the driver's speed through a corridor so that other users of the area are not impacted by speeding traffic. Some common horizontal deflection devices include:

***Bulbouts and Curb Extensions** are curb extensions at intersections that reduce curb to curb roadway width. They tighten corner curb radii reducing the speeds of turning motorists, as well as shorten crossing distances, widen sidewalks, and accommodate landscaping.

***Chokers and Neckdowns** are midblock curb extensions that reduce roadway width. They are typically designed to shorten crossing distances, widen sidewalks, and accommodate landscaping.

***Chicanes** are curb extensions that form 'S' turns by alternating from one side of the roadway to the other. The effect can also be created by alternating on-street parking from one side of the street to the other.

***Gateway Treatments** are special entrances that reduce the width of the travel way, often including the use of islands.

***Landscape Treatments** provide separation between vehicles and pedestrians. They also enhance streets by providing a sense of place.

***Medians** are raised islands between travel lanes that separate vehicle traffic and narrow the

roadway. They provide pedestrian refuge and landscape opportunities.

****Residential Traffic Circles*** are raised circular islands placed in the center of a residential intersection, around which traffic circulates in a counter-clockwise direction.

Implementing Traffic Calming Measures

Traffic Calming does not work by itself, but requires neighborhood support to keep our streets safe. Educating all roadway users to share the road and to respect the rights of other users will increase the safety of our neighborhoods. If you are a driver, respect the right of a pedestrian who is crossing at a marked or unmarked crossing. If you are a pedestrian, do not insist on your right of way and don't put yourself at unnecessary risk. Cross at intersections and use controlled crossings, where possible, on busy streets. As a parent, educate your children on the need for safety when crossing streets. Pay attention to your driving habits and do not exceed the speed limit.

The Town of Newtown has limited resources for street modifications to existing streets. All activities to address traffic issues within a neighborhood will involve participation by the neighborhood. If physical measures are desired and warranted, implementation of traffic calming measures will require fiscal participation by the town..

Following are steps for implementing traffic calming measures in your neighborhood.

1. Contact the Newtown Police Department's Traffic Unit with a definition of the problem. The Traffic Unit will provide educational information for the neighborhood to hand out. If desired, the radar trailer can be positioned on the street in question for period of one week. You can apply for the traffic radar trailer by going online to the Newtown Web site and go to the Police Department. You will find the radar unit request under Forms.
2. If the problem persists, the neighborhood should submit a description of the traffic calming issue in writing with signatures attached from at least ten (10) other households within two blocks of the neighbor submitting the request. The Police Department's Traffic Unit can provide you with a sample form.
3. The Traffic Unit will then conduct an evaluation to determine if warrants and standards are exceeded by conditions on the street.
These standards include the following:
 - *15 percent of the vehicles must be exceeding the posted speed limit by at least 15 miles per hour as determined by speed studies.
 - *The roadway characteristics such as hills or curves exceed sight distance standards
 - *The road is a town not state road
 - *The road is not a designated emergency route
 - *Average daily traffic is not under 500 vehicles, nor over 15,000
4. If warrants and standards are met the street or impact area will be evaluated at the appropriate time by The Newtown Police Commission. Advance notice of a public hearing to consider the traffic issue will be sent to the impacted neighborhood as well as being posted on the Commission Agenda notice.

5. Based on the Traffic Unit's evaluation and the public hearing, the Police Commission will recommend a measure or combination of measures, including the planned evaluation of the recommended program every six months. A Traffic Engineering Study may be required by The Police Commission. If a Traffic Engineering Study is required The Police Commission will request funding from The Board of Selectman. Once approved the Traffic Study will be completed.
6. If more than sixty six percent of the impacted neighborhood households (As defined by the Police Commission) supports the solution in a confidential vote (The Police Department will mail the ballots to the impacted households) The Police Commission will place the measure on the priority list and seek funding from The Board of Selectman.. Once funding is secured The Police Commission will authorize the Department of Public Works to design and implement the Traffic Calming Plan according to required engineering standards. The Police Commission will review and approve the Engineered Traffic Calming Plan once completed by The Department of Public Works and develop an effectiveness measurement plan in conjunction with the Newtown Police Traffic Unit.
7. Once implemented The Traffic Unit will measure The Traffic Calming Program's effectiveness every six months and report the results to the Police Commission. If the Traffic Calming Program creates a dangerous condition, is found to divert more than 5% of the previously measured daily traffic flow, or fails to meet it's objectives the Traffic Calming devices will be removed by The Police Commission and The Department of Public Works.
8. If the Impacted Neighbors decide they would like to have the Traffic Calming Program removed a confidential vote administered by the Police Department by 75% of the Impacted Neighbors will be required. A signed petition by 50% of the original impacted area and presented to The Police Commission will be required to initiate the confidential balloting process.

Toolbox

The following pages describe and illustrate each of the traffic calming tools included in this resource guide. There is not a single tool to solve all traffic issues and one tool that may work well in one area for a particular issue may not be effective in another situation. Key to successful traffic calming is community acceptance and municipal support/maintenance. Not every tool may be appropriate or acceptable for each municipality. Traffic calming measures can generally be separated into three groups based on the goal they are trying to achieve: speed control, volume control, and safety enhancement. These three categories are not as distinct as they may seem as speed reduction measures may divert traffic to other streets and efforts to control cut-through traffic may also decrease the speeds of the traffic using the road. Safety enhancement measures are not implemented for the sole purpose of calming traffic rather they are installed to address a safety concern. However, certain safety enhancements have the additional benefit of raising driver awareness and slowing traffic. Effective traffic calming strategies often include using more than one of the tools. Traffic calming should be designed with a systematic approach with appropriate and frequent enough spacing of measures and consideration for secondary effects of the installations.

Speed Control Measures:

- Speed Table
- Raised Intersection Pavement
- On-Street Parking
- Traffic Circle
- Neckdown/Bulb Out/Curb Extension
- Traffic Island/Median
- Gateway Display Board
- Pavement Marking
- Edge Treatment
- Raised Crosswalk
- Textured and Colored
- Modern Roundabout
- Narrowed Lane
- Chicane
- Landscaping
- Stationary Radar Sign/Speed
- Signage
- Reduced Corner Radii

Volume Control Measures:

- Roadway Closure
- Turn Restriction
- Diverter
- One-way Street Circulation Change

Safety Enhancements:

- In-Pavement Lighting
- Bike Lane

In addition to describing the tools, a list of general pros and cons associated with each tool is also presented. The intent is to provide the reader with a quick indication of what might be expected if this measure is implemented. Again, certain measures may or may not realize their full advantage or drawbacks depending on site specific conditions and circumstances. Also included for each measure is a rough or relative cost¹. The costs are broken down into ranges low, moderate, and high. Costs can vary significantly depending on materials, design requirements,

etc. The costs as presented do not include maintenance of the measures after they are installed. It is recommended that additional cost research be done to confirm and customize costs prior to finalizing any traffic calming plan. The summary Matrix (Table 1) lists the traffic calming tools in the resource guide and provides a brief description of each measure, the issue it's intended to address, what it's best used for and not intended to be used for, an idea of cost (where available), and other commentary regarding the tool. This matrix is a concise summary of the traffic calming tools.

TRAFFIC CALMING TOOL BOX

Description: Speed Humps



Speed humps are raised areas of roadway deflecting both the wheels and frame of traversing vehicles. They are typically 12-, 14-, or 22- feet long and are usually found on neighborhood streets, not on major roadways or primary emergency vehicle routes. The speed hump should terminate before the gutter pan, so as to not interfere with proper storm water drainage.

Pros:

- Speed reduction
- Relatively low-cost
- Easy to test

Cons:

- Increased roadway noise
- Maintenance costs
- Required signage costs and aesthetics
- Slower emergency vehicle response times
- Extra care required when snowplowing

Costs:

\$1,000 - \$12,000 each

Description: Speed Tables



Speed tables are raised areas of roadway, including crosswalks that are higher than the surrounding roadway approaches. Like speed humps, they deflect both the wheels and frame of traversing vehicles. They are typically 22-feet long or longer.

Pros:

- Speed reduction
- Relatively low-cost
- Easy to test

Cons:

- Increased roadway noise
- Maintenance costs
- Required signage costs
- Slower emergency vehicle response times
- Not as effective as speed humps in slowing traffic.

Costs:

\$2,000 - \$15,000 each

Description: RAISED CROSSWAK



Raised crosswalks are elongated speed humps that feature a flat top at the same elevation as the adjacent sidewalks. They can be found at intersections or mid block, and should only be used in high pedestrian travel areas.

Pros:

- Speed reduction
- Increase visibility of and for pedestrians

Cons:

- Noise
- Maintenance
- Need for signage

Costs:

Moderate (\$2,000 - \$15,000 each)

Description: RAISED INTERSECTIONS



Raised intersections are raised areas of roadway, including crosswalks that are higher than the surrounding roadway approaches. Like speed humps, they deflect both the wheels and frame of traversing vehicles. For a raised intersection, the entire intersection is at sidewalk grade.

Pros:

- Speed reduction at locations with vehicle-vehicle and vehicle-pedestrian conflicts
- Improved safety

Cons:

- Increased roadway noise
- Maintenance costs
- Required signage costs and aesthetics
- Slower emergency vehicle response times

Costs:

Raised intersections - \$50,000 - \$200,000 each

Description: Textured and Colored Pavement



Paving materials such as brick, cobbles, or concrete pavers can be used to identify a traffic calmed area. The variety of color and texture signal to drivers that they are traveling in a pedestrian centric zone. Some projects include colored and textured pavement along the entire calmed roadway, while others limit the special pavement to the edges of calmed areas to announce entry into a new area where through traffic is not the priority. Bricks or blocks are sometimes also used to provide the same traffic calming benefits as rumble strips, delineating crosswalks and pedestrian zones.

Pros:

Textured pavements attract the driver's attention visually, audibly, and physically and are ideal for residential and neighborhood shopping areas. They are permanent and effective and can add to the aesthetic identity of a neighborhood.

Cons:

Some materials, particularly cobblestones, present a hazardous riding surface to bicyclists. Loose or uneven installations of paving stones pose a tripping hazard to pedestrians and should be regularly inspected, increasing maintenance costs over ordinary asphalt or concrete pavement.

Costs:

Moderate to High. Costs vary depending on materials used and size of paving area.

Description: On Street Parking – Parallel and Angled



On-street parking, both parallel and angled, helps to narrow roadways and calm traffic. The proximity of parked vehicles and necessity to watch for exiting vehicles and opening doors slows traffic. Angled parking can accommodate more cars per block than parallel parking.

Pros:

On-street parking creates a buffer between pedestrians and motorists, improving the walking environment. On-street parking in business districts is generally welcomed.

Cons:

On-street parking impedes traffic flow. Angle parking creates more right-of-way impacts. Drivers have reduced visibility backing out of angled parking spots, posing a greater risk to bicyclists. If angled parking is selected, back in/ head out parking is preferred to provide better visibility when exiting a parking space, reducing the danger to motorists and bicyclists.

Costs:

Generally low with adequate roadway width.

Description: Modern Roundabout



A modern roundabout is a raised island in the center of an intersection. Roundabouts are used on higher volume arterial streets to allocate right-of-way between competing movements and provide a cost-effective alternative to traffic signals.

Pros:

They can reduce vehicle queues and improve safety at intersections with high crash rates.

Cons:

Compared to traditional intersections, modern roundabouts require more right of way, increasing the crossing distance for pedestrians and possibly making it more difficult for large vehicles, such as fire trucks and transit buses, to negotiate. Converting an existing traditional intersection may require eliminating nearby on street parking and, especially if landscaped, require more maintenance than traditional intersections.

Costs:

\$80,000 - \$800,000 each, depending on diameter, right-of-way

Description: Traffic Circle



Another variation used in residential traffic calming is the traffic circle, which is used more to slow driving speeds approaching intersections with high crash rates than to improve traffic flow (as with a modern roundabout). Motorists must reduce speed to maneuver around the circle, which helps reduce the frequency and severity of crashes.

Pros:

Permanent installation forces reduced speeds at subject intersection. Flexible installation allows retrofit to existing junction intersections, without costly roadway re-alignment. Can provide gateway or identity to a neighborhood.

Cons:

A single roundabout used in isolation will not significantly calm traffic. A coordinated system of multiple traffic circles or other calming measures is required. Motorists may ignore painted traffic circles, and drive right over them. Raised traffic circles may interfere with snow plowing operations.

Costs:

\$6,000 - \$12,000 each

Description: Narrowed Lanes

Studies have shown that wider travel lanes allow for faster vehicular travel speeds. Conversely, drivers naturally go more slowly when navigating narrow travel lanes, providing a more subtle calming effect than other physical calming methods. However, narrow lanes also slow emergency vehicle response times. One solution is to visually narrow lanes using paint, while leaving a several foot shoulder that emergency vehicles can utilize

– effectively providing a narrow lane for motorists and a wider lane for emergency vehicles.

Lanes can also be physically narrowed by providing on street parking on one, or both, sides or by adding bollards, planters, or bike lanes. Without other provisions for bicyclists, the narrower road may increase motor vehicle/bicycle conflicts. Narrowing traffic lanes differs from other road treatments by making slower speeds seem more natural to drivers and less of an artificial imposition, as opposed to other physical treatments that compel lower speeds or restrict route choice.

Pros:

Travel speeds are typically higher on four-lane roadways than on two-lane roads. Excess right-of-way can be shifted to providing wider sidewalks, bicycle lanes, or on-street parking. Narrowing the number of travel lanes also facilitates additional calming methods such as neck downs and mid-block bulb outs. Simple roadway restriping to achieve roadway narrowing is inexpensive.

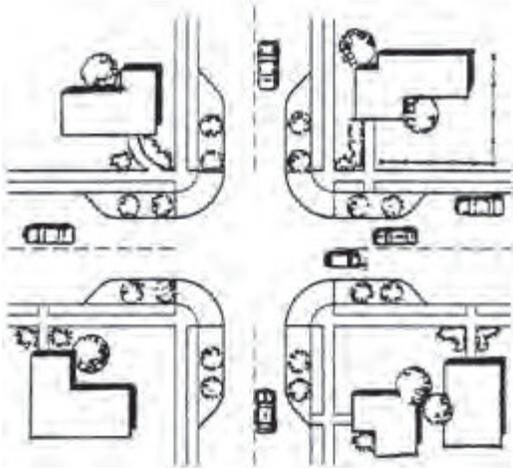
Cons:

Reducing the number of travel lanes reduces the overall capacity of the roadway possibly increasing congestion and reducing the vehicular level of service (LOS).

Costs:

\$1,000 - \$10,000/mile

Description: Neckdowns



Neckdowns or bulb outs narrow the roadway by extending the curb at key intersections and mid-block locations.

Pros:

Neckdowns and bulb outs slow traffic, reduce turning speeds, and increase pedestrian safety by reducing crossing distance. They shift the focus of the street towards creating a walkable environment.

Cons:

- Relatively high initial costs
- Loss of on-street parking
- Increased maintenance costs
- Complicates plowing and street sweeping operations
- Can hinder drainage

Costs:

\$2,000 - \$20,000 each, depending upon size and material

Description: Chicanes



Common in Europe, chicanes are a set of two or more alternating curb bulbs or extensions that narrow and realign the roadway for short segments. Since the street is no longer straight, drivers must slow down to negotiate the roadway. Two-way traffic and full access for larger vehicles and emergency services can be maintained. A chicane effect can be created using various methods, including concrete curbs, landscaped areas or alternating diagonal and parallel parking.

Pros:

By creating a slalom effect, chicanes reduce vehicle speeds and discourage cut-through traffic. These methods can improve the appearance and function of the street and provide opportunity for parking.

Cons:

Concrete chicanes complicate street maintenance and storm water drainage and can hinder emergency vehicle and bus operations. They may require additional right of way to construct as well and if designed incorrectly could encourage motorists to attempt to navigate them at high rates of speed.

Costs:

\$10,000 - \$30,000

Description: Traffic Islands and Medians



Concrete or landscaped islands typically located down the center of a roadway or at a roadway entrance

Pros:

Landscaped or concrete traffic islands and medians can reduce speeds by narrowing drivable travel lane widths. They can improve pedestrian accommodation by providing a mid-block pedestrian refuge at crossings. They complement improved crosswalks and reduce pedestrian crossing width. They can be used to provide a visual enhancement or gateway to promote neighborhood identity.

Cons:

Traffic islands and medians may reduce parking and driveway access, and also the narrower road may increase motor vehicle/bicycle conflicts.

Costs:

Varies depending on length, materials and right-of-way availability.

Description: Landscaping



Landscaping is used in conjunction with other traffic calming measures such as roadway narrowing, traffic islands, and sidewalk improvements to improve the pedestrian environment, define pedestrian and vehicle areas, and provide horizontal separation between motor vehicles and pedestrians.

Pros:

Landscaping increases motorists' awareness and can help define a neighborhood identity. Its installation is long term and increases the quality of life of a community.

Cons:

Depending on the design, the installation and maintenance costs can be high. Right-of-way impacts may be significant as well.

Costs:

Moderate to high - varies depending on scale and materials/plantings

Description: Gateways



A signing and/or landscaping treatment to alert motorists they are entering a special area can be used at entrances to neighborhoods, commercial areas, town centers, or busy places of activity. Gateways are typically supplemented with other traffic calming measures.

Pros:

Can be visually aesthetic and heighten awareness.

Cons:

Generally expensive and can require routine maintenance.

Costs:

Varies

Description: Stationary Speed Display Boards



Radar signs are interactive signs that draw motorists' attention to their speed and the road's legal speed limit. They work by alerting motorists when they're exceeding the speed limit. They can be used in residential areas, school zones, construction zones, or other safety zones. Radar signs can be permanently mounted on signposts or temporary installations using self-contained trailers.

Pros:

Radar signs have proven to slow down traffic, even years after their initial installation. They are particularly effective on high volume arterials and highways, where physical measures would restrict traffic flow.

Cons:

Radar signs do not slow traffic as much as physical measures. Motorists' compliance is voluntary. Enforcement is still necessary.

Costs:

\$5,000 - \$15,000 each

Description: Pavement Markings



Pavement markings are another means to alert or inform a motorist of a condition or a potential situation. Painted lines and symbols need to be selected and placed in accordance with the Manual on Uniform Traffic Control Devices (MUTCD). Some examples include: The word “SLOW” can be painted on a travel lane to encourage motorists to drive slowly and painted white edgelines can be used to visually narrow streets. Crosswalks can be used to alert motorists of pedestrian activity. Pavement markings are also used in conjunction with signs and other measures.

Pros:

Low cost and easy to install. Can increase awareness.

Cons:

Requires regular maintenance and may not be consider visually aesthetic. Not visible with snow covered roads.

Costs:

Low

Description: Signage



Traffic signs can be used to alert or inform motorists of a condition or a potential situation. Signs need to be selected and placed in accordance with the Manual on Uniform Traffic Control Devices (MUTCD). Speed limit signs, pedestrian/bicycle/school crossing signs, and in-street pedestrian crossing signs have been used by municipalities to warn motorists of high pedestrian activity, and can help to reduce speeds. Signs are also used in conjunction with other measures such as pavement markings.

Pros:

- Low cost
- Increases awareness

Cons:

Can be considered to clutter the roadway especially on a residential street. In-street signs may get hit or may need to be removed at night and placed back during the day. Overall effectiveness can vary.

Costs:

Varies, depending on type and amount of signage

Description: Edge Treatment



Edge treatments, such as raised curbs, provide uniform cross sections with identifiable edges along an entire corridor. They often signal a lower design speed to drivers. Raised curbs also allow placing roadside objects such as trees and street furniture closer to the roadway, producing a traffic calming effect. Where curbs are impractical, pavement markings or changes in pavement texture may be used to create a similar effect.

Pros:

Edge treatments define a corridor, increasing awareness. These treatments can also visually “narrow” a roadway.

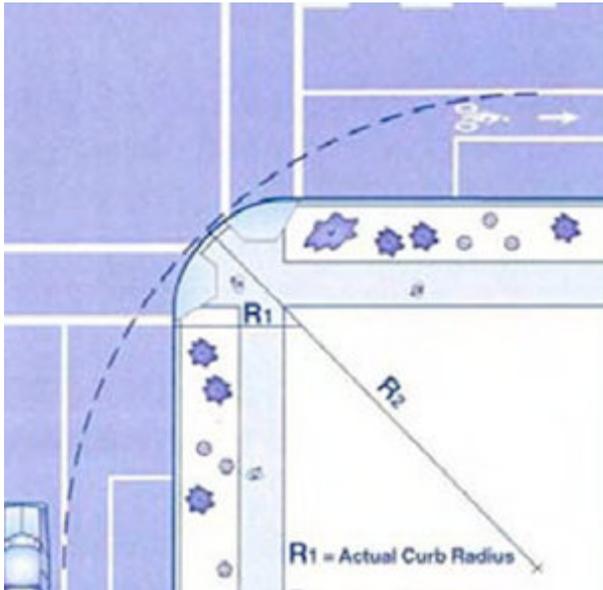
Cons:

- Potential right-of-way impacts
- Potential drainage impacts and costs to accommodate

Costs:

Moderate to high (varies)

Description: Reduce Corner Radii



This calming method is used at intersections to make turning movements tighter. It typically is used in conjunction with other calming techniques like neck downs and raised crosswalks. This effectively slows turning vehicles and increases pedestrian safety. The reduced radius, however, also can limit truck and bus turning – negatively impacting both emergency vehicles and transit operations.

Pros:

- Slows turning vehicles
- Promotes pedestrian safety
- Improves motor vehicle and pedestrian sight distances
- Shortens crossing distance

Cons:

- Impacts truck/bus turning
- Slows emergency vehicles and large transit vehicles

Cost:

Low to median

Description: Diverters



Several types of diverters can be used to channelize or restrict traffic flow at intersections. They are used to prevent through movements and interrupt the traffic grid. **Diagonal diverters** prevent through movements while allowing right-turn movements from two of the approaches and left turn movements from the other two approaches. **Star diverters** prevent through movements, while allowing right turns from all four intersection approaches. **Island diverters** prevent through movements from two approaches, while allowing cross-traffic to proceed straight. And **semidiverters** can either prevent in or out traffic for a single approach, changing a two-way road to one way.

Pros:

Diverters limit access and reduce through traffic, without preserving pedestrian access. They can also be designed to favor bicycle travel, creating quiet, efficient bicycle boulevards through neighborhoods.

Cons:

Diverters may create frustration for motorists confused by the irregular traffic pattern. They may impede transit and emergency vehicle operations, though certain design features can be included to maintain access for authorized vehicles. The shift in traffic patterns can have unintended consequences, sending more traffic to other nearby residential streets.

Costs:

\$15,000 - \$45,000

Description: Turn Restrictions



Restricting certain turns at intersections to influence travel patterns

Pros:

- Low cost
- Reduces cut-through traffic

Cons:

- Inconveniences residents of streets
- Can create circuitous traffic patterns
- Can be hard to enforce

Costs:

Low

Description: Circulation Changes



Changing one or more roadways or segments of roadways from two-way to one-way to alter travel patterns within neighborhoods or villages.

Pros:

- Prevents some cut-through patterns
- Relatively inexpensive
- Can increase level of service at intersections by removing some traffic movements
- Can free up roadway width for on-street parking

Cons:

- Creates more circuitous travel routes for valid destinations within neighborhoods
- Creates inconveniences to residents of neighborhood
- Can be confusing
- Shift some traffic volume to other streets
- Often controversial

Costs:

Low

Description: In Pavement Lighting



In-pavement lights are being used at crosswalks to alert motorists to the presence of a pedestrian crossing or preparing to cross the street. The amber lights are embedded in the pavement on both sides of the crosswalk and oriented to face oncoming traffic. When the pedestrian activates the system, either by using a push-button or through detection from an automated device, the lights begin to flash at a constant rate, warning the motorist that a pedestrian is in the vicinity of the crosswalk ahead.

Pros:

- Increases driver awareness of upcoming crossing
- Particularly effective near school campuses or transit hubs with heavy concentrations of pedestrian activity after dark.

Cons:

- Cost vs. traditional crosswalk
- Design must take into account snow removal
- In-pavement light fixtures and automatic sensors can be covered temporarily by snow or other debris.

Costs:

Approximately \$35,000

Description: Bike Lanes



Designating a portion of the existing roadway cross-section exclusively for bicycle use.

Pros:

- Slows speed
- Provides for bicycle access

Cons:

- Reduces roadway capacity
- If not designed well, can create safety concerns

Costs:

Low